

REMARKS

Claims 1-9 are all the claims pending in the application.

Claim rejections under 35 U.S.C. § 102

Claims 1, 2 and 6 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Kokami et al. (U.S. Patent No. 6,900,604; hereinafter “Kokami”). Applicants traverse the rejection.

Claim 1

In the Amendment filed July 7, 2008, Applicants submitted that Kokami does not teach or suggest “a rotor position estimating section (200) for calculating electrical angle of the rotor of the motor”, as recited in claim 1.

In response, the Examiner asserts that:

Kokami et al teach determining pole position from the induced voltage (abstract). There is nothing in applicant’s claims languages that precludes the examiner from reading determining a calculating and thus meeting the claimed limitations.

Applicants respectfully disagree with the Examiner for at least the following reasons.

Kokami is directed to a drive control system for sensor-less motor applied to the brush-less DC multi-phase motor not including rotation detecting sensor (column 1, lines 6-14). Even though Kokami appears to disclose that the magnetic pole position of rotor is detected by utilizing B-EMF (Back Electromotive Force) induced on a field coil, the function of detecting a rotor position based on B-EMF disclosed in Kokami is quite different from the claimed invention, and does not disclose the claimed features recited in claim 1.

For instance, in Kokami, the coil voltage detection amplifier 16 detects a back electromotive force or induced voltage generated on the motor coils (column 4, lines 21-23), and the magnetic pole position of rotor is detected from the amplitude condition of the induced voltage detected (column 3, lines 10-12). In other words, the rotating position of rotor is detected with the zero-cross phase of B-EMF (column 2, lines 38-39). Detection of magnetic pole position of rotor described above is realized by utilizing the fact that when the power is fed for a short period of time to the motor coil, amplitude of the voltage induced by the mutual induction effect in the non-power feeding phase changes depending on the magnetic pole position of the rotor (column 8, line 65- column 9, line 3).

On the other hand, claim 1 recites a rotor position is estimated by “a rotor position estimating section” comprising each of the following:

- 1). a back EMF detecting section for each phase for calculating a back-EMF of each phase of the motor from the phase voltage or the line voltage, the motor current, a winding resistance and a winding inductance, of the motor;
- 2). an angular speed calculating section for calculating an angular speed of the rotor of the motor by detecting a maximum value in the back-EMF of each phase;
- 3). an electrical angle calculating section for calculating an electrical angle θ of the rotor from the angular speed.

The features explicitly recited in claim 1 are not disclosed in the portions of Kokami cited by the Examiner in alleged support of the rejection, or in any other portion of Kokami.

Specifically, in column 4, lines 19-32, Kokami discloses that the coiled voltage detection amplifier 16 detects a back electromotive force generation on the motor coils Lu, Lv, Lw. However, this disclosure fails to teach or suggest a back EMF detecting section for each phase

for calculating a back-EMF of each phase of the motor from the phase voltage or the line voltage, the motor current, a winding resistance and a winding inductance, of the motor.

Further, in column 4, lines 56-57, Kokami discloses a phase difference detector 22 that detects a phase difference between the zero-cross points of the drive current and a motor rotation control part 32 that judges the rotating speed at the time of the driving motor and shifts to the acceleration mode with the initial drive when the motor is rotating in a lower speed and executes the control such as acceleration with the PLL control when the rotating speed of motor increases to a certain degree. However, the phase difference detector and the motor rotation control part do not teach or suggest an angular speed calculating section for calculating an angular speed of the rotor of the motor by detecting a maximum value in the back-EMF of each phase.

Moreover, in column 12, lines 5-45, Kokami discloses that when a motor drive command is issued, the period of B-EMF of coil is detected first to detect the rotating speed of motor. Next, it is judged where the rotating speed of motor is only a several percents of the target speed or not in order to execute the steady rotation control with the PLL control or execute the drive sequence. In the steady rotation control, rotation control of motor is accelerated with the power feeding phase control in the PLL control (column 12, lines 5-30). Also, in column 9, line 63 to column 10, line 10, Kokami discloses that when an upper limit of rotating speed in the initial drive is raised, a B-EMF generated in the motor becomes large to assure the initial drive and the shift to the steady rotation by the PLL control can be realized smoothly. However, these cited portions of Kokami do not teach or suggest an electrical angle calculating section for calculating an electrical angle θ of the rotor from the angular speed.

In view of the above, Applicants submit that claim 1 is allowable over Kokami because the cited reference fails to teach or suggest all of the features of the claimed invention.

Claims 2 and 6

Applicants submit that claims 2 and 6 depend from claim 1, and therefore are allowable at least by virtue of their dependency.

Claim rejection under 35 U.S.C. § 103(a)

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kokami in view of Acarnley (U.S. Patent No. 6,005,364; hereinafter “Acarnley”).

Claims 4 and 5 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kokami in view of Acarnley and further in view of Koide et al. (U.S. Patent No. 6,188,196; hereinafter “Koide”).

Claim 7 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kokami in view of Furukawa (U.S. Patent No. 5,767,642; hereinafter “Furukawa”).

Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kokami in view of Acarnley and further in view of Furukawa.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kokami et al. in view of Acarnley, Koide and Furukawa.

Applicants traverse the rejection for at least the following reasons.

Claim 3

Applicants respectfully submit that since claim 3 depends from claim 1 and since Acarnley does not cure the deficiency noted above with respect to claim 1, claim 3 is allowable at least by virtue of its dependency and the additional limitations recited therein.

Claims 4 and 5

Applicants respectfully submit that since claims 3 and 4 depend from claim 1 and since Acarnley and Koide do not cure the deficiency noted above with respect to claim 1, claims 4 and

5 are allowable at least by virtue of their dependency and the additional limitations recited therein.

Claim 7

Applicants respectfully submit that since claim 7 depends from claim 1 and since Furukawa does not cure the deficiency noted above with respect to claim 1, claim 7 is allowable at least by virtue of its dependency and the additional limitations recited therein.

Claim 8

Applicants respectfully submit that since claim 8 depends from claim 1 and since Acarnley and Furukawa do not cure the deficiency noted above with respect to claim 1, claim 8 is allowable at least by virtue of their dependency and the additional limitations recited therein.

Claim 9

Applicants respectfully submit that since claim 9 depends from claim 1 and since Acarnley, Koide and Furukawa do not cure the deficiency noted above with respect to claim 1, claim 9 is allowable at least by virtue of its dependency and the additional limitations recited therein.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Christopher R. Lipp
Registration No. 41,157

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: February 4, 2009